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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re Application of: Bruce B. Randolph, Richard L. Anderson, and Robert B. Eldridge

Serial No.: 10/062,858 Group Art Unit: 1754

Filed: February 5, 2002 Examiner: Ngoc Yen M. Nguyen

For: TRANSPORTATION OF HYDROGEN FLUORIDE

APPELLANTS' BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notice of Appeal, which was mailed on September 29, 2004 and the Notification of Non-Compliant Appeal Brief mailed on October 18, 2005, the Appellant respectfully submits this Appeal Brief. Appellants respectfully request that the claims in question be allowed.

Real Party of Interest

ConocoPhillips Company, formerly known as Phillips Petroleum Company, is the assignee of record of the above-captioned Application and, thus, is the real party of interest in this Appeal.

Related Appeals and Interferences

It is believed that there are no appeals or interferences, which will directly affect or be directly affected by or have a bearing on the Board Decision on this Appeal. This Application is a Divisional of Application No. 08/448,697, which was the subject of Appeal No. 1998-1163.

Status of Claims

Appellants appeal the Final Rejection of pending claims 1-81.

Status of Amendments

The Final Office Action was mailed on April 8, 2004, wherein the Examiner finally rejected claims 1-81. A Response after Final was mailed on May 12, 2004. The Examiner maintained the final rejection of claims 1-81 in an Advisory Action mailed June 3, 2004. A Notice of Appeal was mailed on September 29, 2004.

Summary of the Claimed Subject Matter

The present invention relates to a method for the transportation of hydrogen fluoride from a point of origin to a desired destination. At the point of origin, a sulfone is added to the hydrogen fluoride to form a mixture. The mixture is then transported to the desired destination via transportation means which comprise a closed volume wherein the liquid mixture fills less than the entire volume of the closed volume (*see, e.g.,* page 3, lines 3-7 and lines 18-20 to page 4, lines 1-3).

The mixture is then received at the desired destination point (*see, e.g.,* page 3, lines 6-7 and page 15, lines 1-7).

The invention also discloses a method for handling the transportation of hydrogen fluoride wherein a liquid mixture comprising hydrogen fluoride in a

sulfone is transported from a point of origin to a destination point via transportation means which comprise a closed volume wherein the liquid mixture fills less than the entire volume of the closed volume (*see, e.g.,* page 3, lines 1-7, and lines 18-20 to page 4, lines 1-3).

The present invention also includes a method for transporting hydrogen fluoride from a point of origin to a destination point wherein at the point of origin, a sulfone is added to the hydrogen fluoride and the resulting mixture is then transported to the destination point (*see, e.g.,* page 3, lines 14-17).

The mixture is then received at the destination point (*see, e.g.,* page 3, lines 6-7 and page 15, lines 1-7).

The invention also discloses a method for handling and transportation of hydrogen fluoride comprising transporting a mixture of hydrogen fluoride and sulfone from a point of origin to a destination point (*see, e.g.,* page 3, lines 3-7).

Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection to be reviewed on appeal are:

Whether claims 1, 7, 13-14, 16-20, 46-50, 67-71, 74-81 are unpatentable under 35 U.S.C. 103(a) over Wu (U.S. 5,268,127), in view of Peterson et al. (U.S. 5,284,990).

Whether claims 2-6, 8-12, 15, 21-45, and 51-66 are unpatentable under 35 U.S.C. 103(a) over Wu, in view of Peterson et al. as applied to claims 1, 7, 13-14, 16-20, 46-50, 67-81 and further in view of Hutchinson (U.S. 3,488,920).

Whether claims 1-81 are unpatentable under 35 U.S.C. 103(a) over Wu in view of JP 57-92,502 and Hutchinson.

Arguments

The § 103 Rejection of Claims 1, 7, 13-14, 16-20, 46-50, 67-71, 74-81

The Wu patent is directed to resolving problems associated with the corrosive nature of mixtures of HF and sulfolane that makes the storage of such mixtures in carbon steel process equipment commercially impractical (*see* Wu, col. 1, line 52 through col. 2, lines 19 and 32-43). Wu states that diluting HF with sulfolane reduces the fuming tendency of HF making the handling and storage of HF safer and, in the event of a release, the HF will tend to remain in the liquid solution (*see* Wu, col. 1, line 65 through col. 2, line 2). Example II in Wu states that "HF/Sulfolane loading was accomplished at liquid nitrogen temperature through a pressure regulator." (*see* Wu, col. 3, lines 56-57).

Appellants argue the containment pressure for a sulfone and HF mixture of less than 30 psig, as claimed in the instant application, constitutes a patentable improvement over Wu.

The Peterson et al. patent teaches away from the Wu patent by indicating that the only way to resolve safety problems associated with transportation of HF is to not use HF. Peterson states that "HF release mitigation . . . can not protect against HF release during unloading operations or from a rupture of trucks or railroad cars loaded with HF during transportation of HF to the refinery." (*see* Peterson et al., col. 1, lines 43-47). Peterson thus teaches that because the handling of HF is so dangerous and mitigation attempts are ineffective, the only solution to the dangers

associated with handling HF is to replace HF with sulfuric acid (*see* Peterson, col. 1, lines 48-51).

Because the references neither individually nor in combination disclose each and every limitation of Appellants' claimed invention, a *prima facie* case of obviousness of the claimed invention has not been made. The Wu patent discloses HF storage. The transportation of a closed volume containing a hydrogen fluoride and sulfone liquid mixture using a tank car or tank truck as claimed in the instant application, defines a patentable improvement over Wu. The use of closed volume tank cars and tank trucks for the bulk transfer of a liquid mixture of hydrogen fluoride and sulfone, as claimed in the instant application, constitutes a patentable improvement over Wu. Also, maintenance of a vapor space within the tank car/tank truck closed volume containing the HF/sulfone mixture as claimed in the instant application constitutes a patentable improvement over Wu. Furthermore, the vapor space pressure of "less than 30 psig", as claimed in the instant application, constitutes a patentable improvement over Wu.

As for the Peterson patent, there is absolutely no teaching of the use of sulfone as an HF diluent. Actually, Peterson teaches that HF release mitigation is not effective. This suggests that the Wu and Peterson patents are not combinable except as it relates to improper hindsight; particularly, since Peterson indicates that the only approach to addressing the hazards associated with HF handling is not to use it at all (*i.e.*, substitute sulfuric acid for HF). Even if the disclosures of Wu and Peterson were combined, not all of the recited limitations of Appellants' claims can be found in such

combination. For instance, the vapor space requirement of a closed volume containing a liquid HF/sulfone mixture is not taught by either reference.

In any event, Appellants' invention allows for minimization in pressure within the closed volume containing a liquid HF/sulfone mixture. In the specification, Appellants indicated a desirability of minimizing the pressure of the closed volume for reducing the rate of release of its contents in the event of a leak (*see*, specification at page 2, line 3 through page 3, line 2; page 4, line 19 through page 5, line 2; page 4, line 18 through page 6, line 2; and page 13, line 13 through page 14, line 2). However, to keep the contents in liquid form at standard atmospheric conditions, the vapor pressure of the liquid mixture must be lower than that of pure HF. The Peterson patent addresses none of these considerations.

It is thus note that even if it is permissible to combine the Wu and Peterson patents, their combination does not disclose all of the limitations recited in the claims; therefore, a *prima facie* case of obviousness has not been made.

Applicants assert, however, that the two references are not combinable, but, in fact, teach away from each other. Peterson indicates that HF can not be handled safely and that the only solution to this safety concern is to replace HF with sulfuric acid. Thus, Peterson is saying that the transportation of HF with tank cars or tank trucks should not be done at all. Peterson does not even remotely suggest the use of sulfone or sulfolane as an HF diluent. Finally, Peterson does not disclose any of the limitations of the claimed invention; except that Peterson merely indicates that trucks or railroad tank cars can transport HF. Peterson instead provides evidence of a

long felt need to have a safe method of transporting HF, a need provided for by the instant application.

In summary, references should not be combinable; since, there is no suggestion in the Peterson patent that sulfolane can be used with HF. Rather, Peterson teaches that HF can not be used safely and must be replaced. Peterson discloses none of the limitations of the claimed invention except that Peterson does state the tank cars and tank trucks can be used to transport HF. Even if the references are properly combinable, however, the combined discloses fail to teach each and every limitation of the claimed invention. Additionally, Peterson provides evidence of a long felt and unmet need for a safe method of transporting HF. Therefore, no *prima facie* case of obviousness has been made.

The § 103 Rejection of Claims 2-6, 8-12, 15, 21-45, and 51-66

Appellants argue that the instant application is a patentable improvement over Wu, Peterson, and Hutchinson, either alone or in combination.

As stated above, the HF transport method, as claimed in the instant application, is a patentable improvement over Wu and Peterson and provides evidence of a long felt need of safely transporting HF.

Hutchinson discloses recovering hydrogen fluoride from tetrahydrothiophene 1,1-dioxide by applying heat (*see* Hutchinson, col. 3, lines 22-24).

Appellants respectfully state that separating HF from sulfone at a destination point, after being transported there from an origin point, is a patentable improvement over Hutchinson.

There is also no motivation to combine the Wu, Peterson, and Hutchinson references. As stated above, Peterson indicates that HF can not be handled safely, and that the only solution to this safety concern is to replace HF with sulfuric acid. There is no suggestion in Peterson to transport HF at all, whether alone or as a mixture. Therefore, there is no motivation to combine these references, apart from improper hindsight.

The § 103 Rejection of Claims 1-81

JP 57-92,502 discloses reacting HF with pyridine to form a complex, and the complex can be stored or transported (*see* Constitution). The Examiner states "It would have been obvious to one of ordinary skill in the art at the time the invention was made to transport the mixture of HF and sulfolane as disclosed Wu '127 as suggested by JP '502 because JP '502 teaches that it is desirable to safely transport HF as well as to safely store HF." (*see* Office Action, Page 8, second paragraph). Appellants respectfully disagree.

The Constitution of the JP '502 reference teaches reacting HF with a pyridine to form a complex. It does not disclose mixing HF with sulfone. There is no motivation to combine the Wu, Peterson, Hutchinson and JP 57-92,502 references. There is no suggestion in Peterson to transport HF at all. Furthermore, transporting an HF/pyridine complex safely does not, in any way, make it obvious that an HF/sulfone mixture could be transported safely as well.

Based on the foregoing remarks, it is respectfully suggested that claims 1-81 are patentable over the prior art. Reversal of the Final Rejection of claims 1-81 is respectfully requested.

Respectfully submitted,

CONOCOPHILLIPS COMPANY -
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450, on

17 November 2005
(Date)

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Bronwyn A. Welvaert

Claims Appendix

THAT WHICH IS CLAIMED:

1. (Previously Amended) A method for the transportation of hydrogen fluoride from a point of origin to a destination point, said method comprising the steps of:

adding at said point of origin a sulfone to the hydrogen fluoride to form a liquid mixture;

thereafter transporting by transportation means for transferring said mixture from said point of origin to said destination point, said transportation means comprises a closed volume selected from the group consisting of tank cars, tank trucks and portable vessels, and wherein said liquid mixture fills less than the entire volume of said closed volume to form a vapor space therein and wherein the percent partial pressure of hydrogen fluoride in said vapor space is less than 100 molar percent and wherein the pressure within said vapor space is less than 30 psig.

2. (Previously Amended) A method as recited in claim 1, further comprising:

separating at said destination point said liquid mixture into a sulfone phase and a hydrogen fluoride phase.

3. (Original) A method as recited in claim 2 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

4. (Original) A method as recited in claim 3 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

5. (Original) A method as recited in claim 4, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

6. (Original) A method as recited in claim 5 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

7. (Previously Amended) A method for handling and transportation of hydrogen fluoride, said method comprising the step of:

receiving at a destination point a volume of a liquid mixture comprising hydrogen fluoride and sulfone by way of transportation means for transferring said volume from a point of origin to said destination point, said transportation means comprises a closed volume selected from the group consisting of tank cars, tank trucks and portable vessels, and wherein said liquid mixture fills less than the entire volume of said closed volume to form a

vapor space therein and wherein the percent partial pressure of hydrogen fluoride in said vapor space is less than 100 molar percent and wherein the pressure within said vapor space is less than 30 psig.

8. (Previously Amended) A method as recited in claim 7, further comprising:

separating at said destination point said liquid mixture into a sulfone phase and a hydrogen fluoride phase.

9. (Previously Amended) A method as recited in claim 8, further comprising:

returning said sulfone phase to said point of origin; and

adding at said point of origin said sulfone phase to hydrogen fluoride to form said liquid mixture.

10. (Previously Amended) A method as recited in claim 9 wherein said liquid mixture includes a weight ratio of sulfone to hydrogen fluoride in the range from about 1:100 to about 100:1.

11. (Original) A method as recited in claim 10 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

12. (Original) A method as recited in claim 11 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

13. (Previously Amended) A method for handling and transportation of hydrogen fluoride, said method comprising the step of:

transporting by transportation means for transferring a liquid mixture comprising hydrogen fluoride and a sulfone from a point of origin to a destination point, said transportation means comprises a closed volume selected from the group consisting of tank cars, tank trucks and portable vessels, and wherein said liquid mixture fills less than the entire volume of said closed volume to form a vapor space therein and wherein the percent partial pressure of hydrogen fluoride in said vapor space is less than 100 molar percent and wherein the pressure within said vapor space is less than 30 psig.

14. (Previously Amended) A method as recited in claim 13 wherein said liquid mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

15. (Original) A method as recited in claim 14, wherein said sulfone is sulfolane.

16. (Previously Amended) A method for the transportation of hydrogen fluoride from a point of origin to a destination point, said method comprising the steps of:

adding at said point of origin a sulfone to the hydrogen fluoride to form a liquid mixture; and

thereafter transporting said liquid mixture by transportation means for transferring a volume of said liquid mixture from said point of origin to said destination point.

17. (Previously Amended) A method as recited in claim 16 wherein said transportation means comprises a closed volume selected from the group consisting of tank cars, tank trucks, and portable vessels including tanks, drums, barrels and bottles, and wherein said liquid mixture fills less than the entire volume of said closed volume to form a vapor space therein and wherein the percent partial pressure of hydrogen fluoride in said vapor space is less than 100 molar percent and wherein the pressure within said vapor space is less than 30 psig.

18. (Original) A method as recited in claim 16 wherein said transportation means is a tank car.

19. (Original) A method as recited in claim 16 wherein said transportation means is a tank truck.

20. (Original) A method as recited in claim 16 wherein said transportation means is a portable vessel.

21. (Original) A method as recited in claim 16, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

22. (Original) A method as recited in claim 21, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

23. (Previously Amended) A method as recited in claim 22 wherein said liquid mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 about 100:1.

24. (Original) A method as recited in claim 23 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

25. (Original) A method as recited in claim 24 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

26. (Original) A method as recited in claim 17, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

27. (Original) A method as recited in claim 26, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

28. (Original) A method as recited in claim 27 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 about 100:1.

29. (Original) A method as recited in claim 28 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

30. (Original) A method as recited in claim 29 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

31. (Original) A method as recited in claim 18, further comprising:.

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

32. (Original) A method as recited in claim 31, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

33. (Previously Amended) A method as recited in claim 32 wherein said liquid mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 about 100:1.

34. (Original) A method as recited in claim 33 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

35. (Original) A method as recited in claim 34 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

36. (Original) A method as recited in claim 19, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

37. (Original) A method as recited in claim 36, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

38. (Original) A method as recited in claim 37 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 about 100:1.

39. (Original) A method as recited in claim 38 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

40. (Original) A method as recited in claim 39 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

41. (Original) A method as recited in claim 20, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

42. (Original) A method as recited in claim 41, further comprising:

returning said sulfone phase to said point of origin to reuse as said sulfone.

43. (Original) A method as recited in claim 42 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 about 100:1.

44. (Original) A method as recited in claim 43 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

45. (Original) A method as recited in claim 44 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

46. (Previously Amended) A method for handling and transportation of hydrogen fluoride, said method comprising the step of:

receiving at a destination point a discrete volume of a mixture comprising hydrogen fluoride and sulfone by way of transportation means for transferring said volume from a point of origin to said destination point.

47. (Original) A method as recited in claim 46 wherein said transportation means includes tank cars, tank trucks, and portable vessels including tanks, drums, barrels and bottles.

48. (Original) A method as recited in claim 46 wherein said transportation means is a tank car.

49. (Original) A method as recited in claim 56 wherein said transportation means is a tank truck.

50. (Original) A method as recited in claim 56 wherein said transportation means is a portable vessel.

51. (Original) A method as recited in claim 46, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

52. (Original) A method as recited in claim 51 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

53. (Original) A method as recited in claim 52 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

54. (Original) A method as recited in claim 53 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

55. (Original) A method as recited in claim 48, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

56. (Original) A method as recited in claim 55 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

57. (Original) A method as recited in claim 56 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

58. (Original) A method as recited in claim 57 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

59. (Original) A method as recited in claim 49, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

60. (Original) A method as recited in claim 59 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

61. (Original) A method as recited in claim 60 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

62. (Original) A method as recited in claim 61 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

63. (Original) A method as recited in claim 50, further comprising:

separating at said destination point said mixture into a sulfone phase and a hydrogen fluoride phase.

64. (Original) A method as recited in claim 63 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 100:1.

65. (Original) A method as recited in claim 64 wherein said sulfone phase comprises sulfone and contains less than about 20 weight percent hydrogen fluoride.

66. (Original) A method as recited in claim 65 wherein said hydrogen fluoride phase comprises hydrogen fluoride and contains a weight ratio of sulfone to hydrogen fluoride of less than about 2:100.

67. (Previously Amended) A method for handling and transportation of hydrogen fluoride, said method comprising the step of:

transporting a mixture comprising hydrogen fluoride and sulfone by transportation means for transferring a volume of said mixture comprising hydrogen fluoride and sulfone from the point of origin to a destination point.

68. (Original) A method as recited in claim 67 wherein said transportation means includes tank cars, tank trucks, and portable vessels including tanks, drums, barrels and bottles.

69. (Original) A method as recited in claim 67 wherein said transportation means is a tank car.

70. (Original) A method as recited in claim 67 wherein said transportation means is a tank truck.

71. (Original) A method as recited in claim 67 wherein said transportation means is a portable vessel.

72. (Original) A method as recited in claim 67 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 1:100.

73. (Original) A method as recited in claim 72 wherein said sulfone is sulfolane.

74. (Original) A method as recited in claim 68 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 1:100.

75. (Original) A method as recited in claim 74 wherein said sulfone is sulfolane.

76. (Original) A method as recited in claim 69 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 1:100.

77. (Original) A method as recited in claim 76 wherein said sulfone is sulfolane.

78. (Original) A method as recited in claim 70 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 1:100.

79. (Original) A method as recited in claim 78 wherein said sulfone is sulfolane.

80. (Original) A method as recited in claim 71 wherein said mixture includes a weight ratio of sulfone to hydrogen fluoride in the range of from about 1:100 to about 1:100.

81. (Original) A method as recited in claim 80 wherein said sulfone is sulfolane.

Evidence Appendix

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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 57-092502
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(21)Application number : 55-166732
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(72)Inventor : ODA YOSHIO
OTOMA TAKASHI
SEYA HIROMICHI

(54) METHOD FOR STORAGE AND TRANSPORTATION OF HYDROFLUORIC ACID

(57)Abstract:
PURPOSE: To enable the safe storage and transportation of hydrofluoric acid, by reacting hydrofluoric acid with pyridine to obtain a pyridine.hydrofluoric acid complex containing high molar ratio of hydrofluoric acid, and distilling the complex at the desired time and place to obtain hydrofluoric acid.
CONSTITUTION: Hydrofluoric acid (HF) is made to react with pyridine (Py) to obtain Py.(HF)n complex (n≥3), or Py.(HCl) complex is made to react with ≥8 equivalent of HF to obtain Py.(HF)m complex (m≥8). The complex thus obtained has low HF vapor pressure and high safety, and can be stored or transported to anywhere in a conventional container made of, e.g. PE. For obtaining HF, most part of the HF can be released by the vacuum distillation of the complex, according to the formula. When the valve of (n) is large, the utilization ratio of Py becomes sufficiently high, and the resultant Py.(HF)3 can be recycled and reused as the raw material of Py.(HF)n. Or the residual 3mol of HF can be utilized by reacting the Py.(HF)3 with HCl.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

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[Patent number]

[Date of registration]

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[Date of requesting appeal against examiner's decision of rejection]

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Related Proceedings Appendix

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRUCE B. RANDOLPH,
RICHARD L. ANDERSON,
and
ROBERT B. ELDRIDGE

Appeal No. 1998-1163
Application No. 08/448,697

ON BRIEF

Before OWENS, LIEBERMAN, and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 100 through 107. Claims 1 through 84, 86 through 89, and 91 through 99, which are the only other pending claims, have been withdrawn from further consideration pursuant to a restriction requirement. See 37 CFR § 1.142(b) (1959). (Examiner's answer, page 2.)

The subject matter on appeal relates to a closed volume selected from the group consisting of a tank car and a tank truck, which contains a particular vapor space defined by the

presence of a particular liquid mixture comprising hydrogen fluoride (HF) and sulfone. (Appeal brief, page 2.) According to the appellants, "[i]t has been discovered that the addition of a sulfone diluent to HF has the benefit of providing a resulting mixture having a lower vapor pressure than that of HF alone." (Specification, page 5, lines 7-9.) Further details of this appealed subject matter are recited in illustrative claim 100 reproduced below:

> 100. A closed volume selected from the group consisting of a tank car and a tank truck, containing a liquid mixture comprising hydrogen fluoride and sulfone, for the bulk transfer of said liquid mixture wherein said liquid mixture fills less than the entire volume of said closed volume to form a vapor space therein and wherein the percent partial pressure of hydrogen fluoride in said vapor space is less than 100 molar percent and wherein the pressure within said vapor space is less than 30 psig.

The examiner relies on the following prior art references as evidence of unpatentability:

Wu	5,268,127	Dec. 7, 1993 (filed Jul. 15, 1992)
Peterson et al. (Peterson)	5,284,990	Feb. 8, 1994 (filed Jul. 16, 1992)

Claims 100 through 107 on appeal stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Wu and Peterson. (Examiner's answer, pages 4-7.)

We affirm the aforementioned rejection.[1]

The examiner has provided substantial evidence establishing that trucks or railroad tank cars loaded with HF were known in the prior art. Specifically, Peterson teaches that "HF is a toxic, volatile gas" and that it can be released "during unloading operations or from a rupture of trucks or railroad tank cars loaded with HF during transportation of HF to the refinery." (Column 1, lines 18-19 and 43-47.) As admitted by the appellants (Appeal brief, page 3), the examiner has identified substantial evidence establishing the knowledge of one of ordinary skill in the art that "[d]iluting HF with tetrahydrothiophene-1,1-dioxide overcomes the fuming tendency of the HF and makes handling and storing the HF both easier and safer."[2] (Wu's column 1, lines 16-19 and 65-67.) The examiner further points to (Examiner's answer, page 4) Wu's teaching that "even if the mixture is accidentally released from its containment facility, the HF tends to remain in the liquid solution rather than to form a dense vapor cloud." (Column 1, line 67 to column 2, line 2.) Although

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[1] The appellants state that "[e]ach of the claims under appeal are separately patentable..." (Appeal brief, p. 3.) As correctly pointed out by the examiner (Examiner's answer, p. 3), however, the appellants do not provide us with any explanation why each claim is considered to be separately patentable. See 37 CFR § 1.192(c)(7) (1995). Accordingly, we select claim 100 from the group of rejected claims and decide this appeal as to the examiner's ground of rejection on the basis of this claim alone.

[2] Wu teaches that tetrahydrothiophene-1, 1-dioxide is "sulfolane", which is described in the appellants' specification

Wu is concerned about inhibiting the corrosive effect of HF on carbon steel, Wu describes the solution of HF and sulfolane as containing from about 1 to about 99 percent by weight of HF and also provides a working example in which the HF/sulfolane ratio is 1/1. (Column 3, lines 9-13 and Example 2.)

Given these teachings in the prior art, we share the examiner's determination (Examiner's answer, page 5) that one of ordinary skill in the art would have found it prima facie obvious to dilute HF contained in a truck or railroad tank car[3] with an effective amount of sulfolane in order to "overcome the fuming tendency" of HF and to regulate the conditions (i.e., pressure and/or temperature) within the tank car to maximize ease of handling and safety as described in Wu. In this regard, we agree with the examiner (id.) that one of ordinary skill in the art would have found it prima facie obvious to optimize the conditions within the tank car to maintain the HF/sulfolane mixture in the liquid state while minimizing the potential release of HF in the event of an accident. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) ("[W]here the

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as a "sulfone." (Wu's col. 1,11. 49-51; specification, p. 7, 1. 11 to p. 8, 1. 5.)

[3] These tank cars would include those that are not filled to 100% capacity as a result of the unloading process or the need for only a partial amount of HF at the refinery.

general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.").

The appellants argue that Wu does not teach any concentration ranges for sulfolane in a mixture of HF and sulfolane. This position is without merit. Appealed claim 100 does not recite any relative amount for the sulfolane in the liquid mixture of HF and sulfolane. Moreover, it is our judgment that one of ordinary skill in the art would have found it prima facie obvious to optimize the amount of sulfolane in the mixture to maximize the advantageous effects described in Wu.

The appellants contend that a vapor space within the tank car and the recited pressure for the vapor space are not described in the applied prior art. (Appeal brief, page 6.) Along these lines, the appellants argue that "it is common within industry to fill vessels to their capacity." (Reply brief, page 2.) We do not find these arguments to be persuasive. Appealed claim 1 encompasses a tank car that is not completely filled (less than 100% full) as a result of deliberate underfilling prior to transport[4] or unloading at the refinery following transport. Both of these situations would be commonplace. Moreover, we agree with the examiner (Examiner's answer, page 6) that it would have been prima facie obvious for one of ordinary

[4] For example, the refinery may not need the full amount of HF that can be loaded onto a tank car.

skill in the art to underfill the tank car to minimize the possibility of accidental spillage during transport. As to the appellants argument that "it is common within industry to fill vessels to their capacity," the appellants have not established that the industry practice would also apply to toxic, volatile compounds such as HF. Regarding the pressure, we have already determined above that one of ordinary skill in the art would have found it prima facie obvious to identify, through routine experimentation, the optimum or workable pressures to maintain the HF/sulfolane mixture in liquid state.

Citing Figure 1 of the present specification, the appellants argue that the examiner's statement that the pressure of the containment facility should be higher than atmospheric pressure is "merely a supposition" because the vapor pressure of an HF/sulfolane mixture having a 1:1 weight ratio at a given temperature is less than about 500 Torr, which is less than atmospheric pressure. (Reply brief, page 2.) We do not subscribe to this argument. As we indicated above, appealed claim 100 encompasses any relative amounts for the sulfone and the HF. Figure 1 shows that for lower amounts of sulfolane, higher pressures are required.

For these reasons and those provided in the examiner's answer, we affirm the examiner's 35 U.S.C. § 103 rejection of

appealed claims 100 through 107 as unpatentable over the combined teachings of Wu and Peterson.

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

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Administrative Patent Judge)
)
)
)
PAUL LIEBERMAN)
Administrative Patent Judge) BOARD OF PATENT
) APPEALS AND
) INTERFERENCES
ROMULO H. DELMENDO)
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RHD/sld

Appeal No. 1998-1163
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